

CLAIMS

1.           A method of detaching and collecting an IC tag  
from a paper sheet to which said IC tag is attached,  
5   comprising:

          a detachment step of detaching said IC tag from  
said paper sheet by applying external force to an adhesive  
surface between said paper sheet and said IC tag; and

          a fractionation step of fractionating the  
10   detached IC tag from other substances.

2.           The method as set forth in claim 1 wherein, in  
said detachment step, said paper sheet is immersed in an  
immersion liquid and external force is applied to said  
15   adhesive surface by a flow of said immersion liquid.

3.           The method as set forth in claim 1 or 2, further  
comprising:

          a fragmentation step of immersing in an  
20   immersion liquid said paper sheet from which said IC tag  
was detached in said detachment step, and disintegrating  
or fragmenting said paper sheet into paper components by  
a flow of said immersion liquid and dispersing said paper  
components in said immersion liquid, said fragmentation  
25   step being followed by said fractionation step.

4.           The method as set forth in claim 3 wherein, in

said fractionation step, a suspension in which said paper components are dispersed by the flow of said immersion liquid is passed through a screen.

5        5.            The method as set forth in any one of claims 2 to 4, wherein a pattern of said flow is changed.

6.            The method as set forth in any one of claims 1 to 5, further comprising:

10            a cleaning step of cleaning said IC tag detached from said paper sheet to remove paper and/or an adhesive adhering to said IC tag.

15        7.            The method as set forth in any one of claims 1 to 6, further comprising:

             a preparation step of swelling said paper sheet by causing said paper sheet to hold a swelling liquid in which paper and/or an adhesive is soluble, said preparation step being followed by said detachment step.

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8.            The method as set forth in claim 6 or 7 wherein, in said preparation step and/or said cleaning step, said adhesive adhering to said IC tag is decomposed by an enzyme.

25        9.            The method as set forth in any one of claims 1 to 3 wherein, in said fractionation step, said IC tag is removed and collected from the suspension in which the

paper components of said paper sheet are dispersed.

10.           The method as set forth in claim 9 wherein said  
suspension is put in a container, said IC tag in said  
5 suspension is caused to sink to a bottom of said container,  
and by supplying a liquid flow containing small bubbles  
into said container, said bubbles are caused to adhere  
to said paper components to float them up to a liquid surface  
of said container.

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11.           The method as set forth in claim 2 or 7 wherein  
heat is applied to said immersion liquid and/or said  
swelling liquid.

15 12.           The method as set forth in any one of claims  
1 to 11 wherein a plurality of IC tags are successively  
processed as one bundle in each of said steps.

13.           The method as set forth in any one of claims  
20 4, 5, 9, and 10 wherein, after collection of said IC tag  
in said fractionation step, a liquid is squeezed from said  
suspension and a residual substance of said suspension  
from which said liquid is squeezed is used as paper material.

25 14.           The method as set forth in claim 13 wherein the  
same liquid is employed in each of said steps, and after  
collection of said IC tag in said fractionation step, a

liquid is squeezed from said suspension and the squeezed liquid is reused in each of said steps.

15.           A system for detaching and collecting an IC tag  
5   from a paper sheet to which said IC tag is attached,  
comprising:

                  a unit for swelling said paper sheet by causing  
said paper sheet to hold a swelling liquid in which paper  
and/or an adhesive is soluble;

10               a detacher for detaching said IC tag from said  
paper sheet by applying external force to an adhesive  
surface between the swollen paper sheet and said IC tag;  
and

                  a fractionator for fractionating the detached  
15   IC tag from other substances.

16.           The system as set forth in claim 15, further  
comprising:

                  a cleaner for cleaning said IC tag detached from  
20   said paper sheet to remove paper and/or an adhesive adhering  
to said IC tag.

17.           An apparatus for detaching and collecting an  
IC tag from a paper sheet to which said IC tag is attached,  
25   comprising:

                  a detaching container for storing a liquid;  
a solid type screen, which is provided within

said detaching container and functions as a filter, for holding said paper sheet to which said IC tag is attached;

an agitator for generating a flow of said liquid within said detaching container by agitating said liquid;

5 and

discharge ports, formed in side and/or bottom surfaces of said detaching container, for discharging paper components, passed through said solid type screen, of the paper components of said paper sheet fragmented within said solid type screen by said flow generated by said agitator.

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18. The apparatus as set forth in claim 17, further comprising:

15 a paper-component processing container for holding a suspension that contains paper components passed through said solid type screen, and separating said suspension into said paper components and a liquid;

a suspension flow path for supplying said suspension from the discharge ports of said detaching container to said paper-component processing container;

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a return flow path for returning to said detaching container said liquid separated by said paper-component processing container; and

25 a pump for circulating said liquid between said detaching container and said paper-component processing container, through said suspension flow path and said

return flow path.

19.           The apparatus as set forth in claim 17 or 18  
wherein said agitator comprises an impeller and a drive  
5   unit for driving said impeller.

20.           The apparatus as set forth in any one of claims  
17 to 19 wherein  
              said agitator operates between a first operating  
10   state in which a swirl flow of said liquid is generated  
within said detaching container in a direction of positive  
rotation and a second operating state in which said swirl  
flow is generated in a direction of reverse rotation; and  
              when agitating said liquid, said first operating  
15   state and said second operating state are switched in  
predetermined cycles.